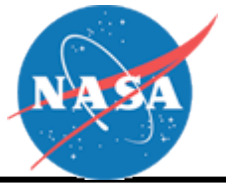
CERES Data Management Activity



Presented to

CERES Science Team

NASA Langley Research Center

April 28, 2009

Erika Geier

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Topics to be Covered

- CERES Background/Overview
- User Access to data sets
- Development and Production Platforms
- Data Versioning
- CERES Processing Approach
- NPP as it compares to Terra/Aqua
- Terra/Aqua Data Sets
  - Edition3
  - Edition2
  - Ordering Data

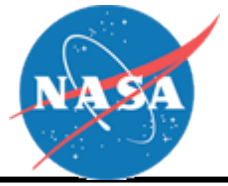
Primary CERES Science Team Goal
(from Terra & Aqua Senior Review)

"… to produce integrated climate data records (CDRs) of the Earth's radiation budget (ERB) from the surface to the top-of-atmosphere (TOA) together with the associated cloud and aerosol properties at climate accuracy."

CERES Overview

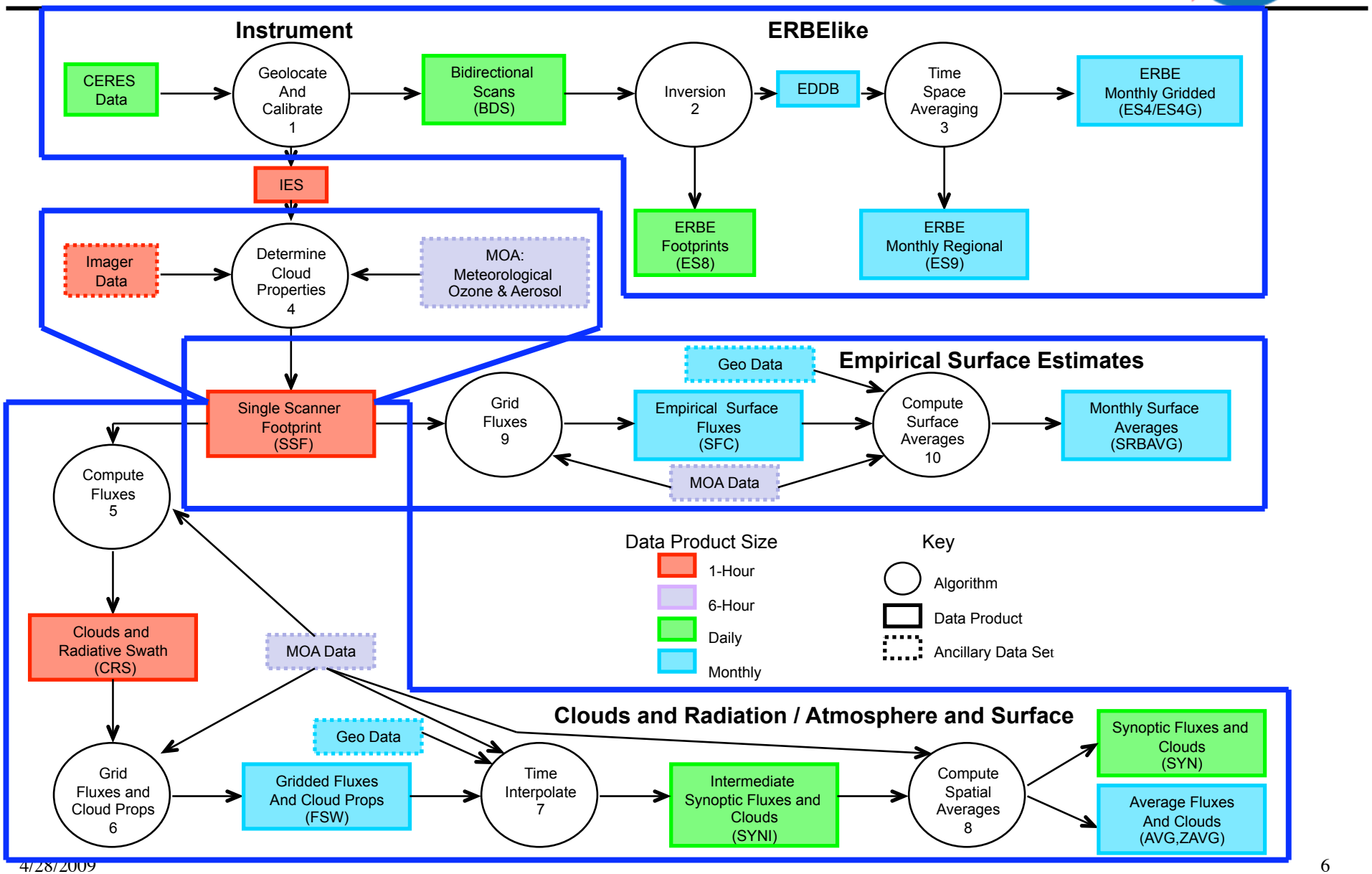
- Past Earth Radiation Budget Experiment (ERBE) and current Clouds and the Earth's Radiant Energy System (CERES) instruments have provided over 25 years of sustained radiation budget measurements.
- LaRC has collected over 32 instrument years of CERES data from instruments on TRMM (1), Terra (2), and Aqua (2).
- CERES PFM on TRMM fully operational Jan'98 – Aug'98 and Mar'00.
- CERES FM1, FM2, and FM3 are still fully operational.
- Shortwave channel on CERES FM4 (Aqua) ceased functioning on March 30, 2005.
- CERES FM5 instrument is on NPOESS Preparatory Project (NPP) satellite currently scheduled for Jan. 16, 2011 launch.
- CERES FM6 instrument is expected to fly on NPOESS C-1 satellite. FM6 to be built by Northrop Grumman. C-1 launch scheduled for 2013.

CERES Statistics
(from the Terra & Aqua Senior Review)

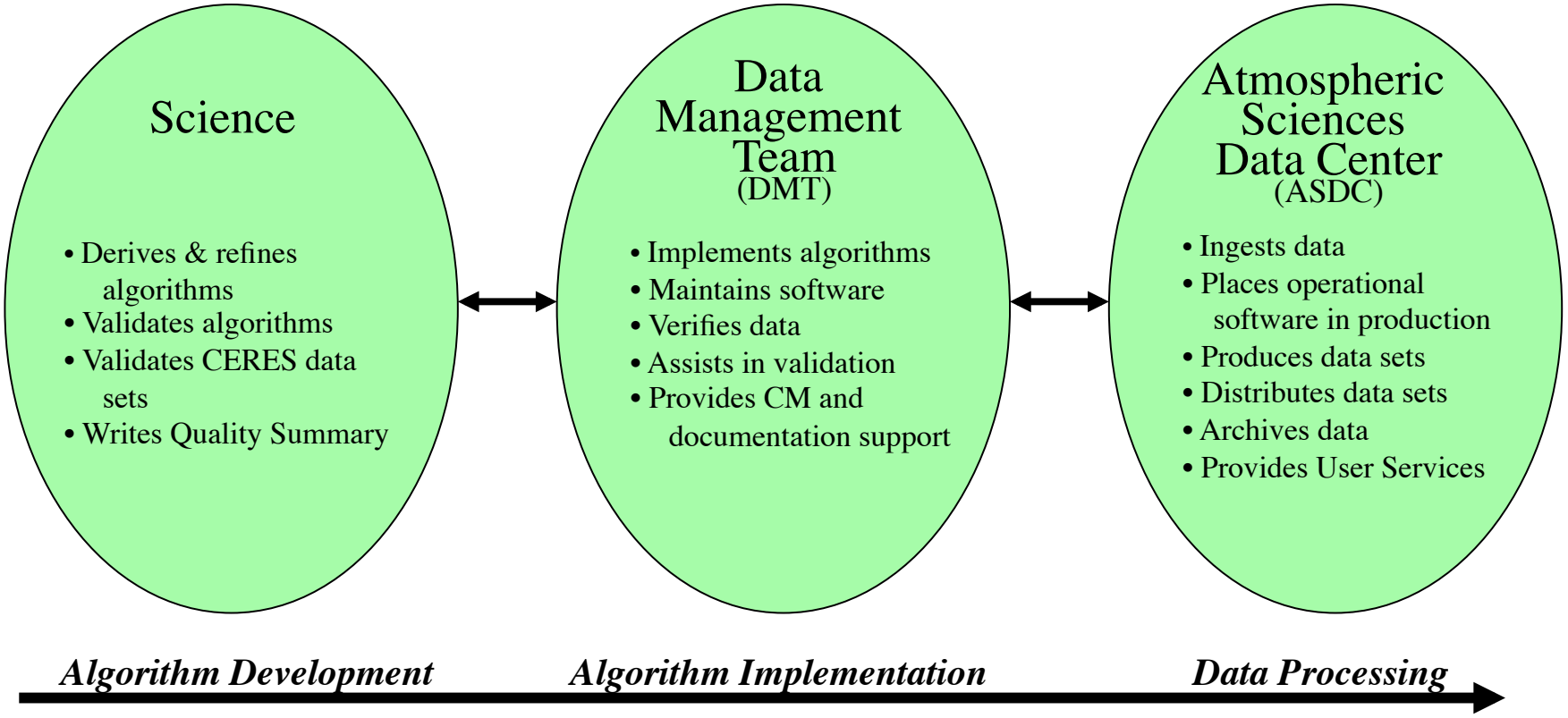


- High level of data fusion
  - 11 Instruments on 7 satellites
- 25 unique input data sources
- 18 CERES data products
- Over 90% of CERES data product data volume involves 2+ instruments
- Individual data products include up to 260 unique parameters
- Approximately 1.7 million lines of QC and validation codes
- Approximately 0.75 million lines of production codes

CERES Top Level Data Flow Diagram



CERES Organization



CERES Subsystems

- CERES is made up of 7 Working Groups
  - Instrument
  - ERBElike
  - Clouds
  - Inversion or ADM
  - SOFA
  - SARB
  - TISA
- Code organized into 12 Subsystems
  - Each subsystem tied to 1 or more working groups
- Each Subsystem made up of 1 or more Product Generation Executives (PGEs)
  - Currently there are a total of 69 active PGEs

Data from other Instruments used by CERES

- CERES Instrument/ERBElike only subsystems that can process when only CERES data available.
- CERES directly uses the following MODIS data sets:
  - MYD02SS1/MOD02SS1* (19 channel radiance subset of every other pixel every other scanline)
  - MYD03/MOD03* (geolocation)
  - MYD04_L2/MOD04_L2 (5 min 10 km aerosol swath)
  - MYD08_D3/ MOD08_D3 (daily 1 deg aerosol)
    - Critical data sets; must have matched pairs to process.
- Additionally CERES uses, Geostationary satellite data:
  - MET-5, MET-6, MET-7, MET-8, MET-9
  - GOES-8, GOES-9, GOES-10, GOES-11, GOES-12
  - GMS-5, MTSAT-1R

CERES Input Data

Type of Data	Parameter Description	Terra/Aqua Freq & Source	NPP Freq & Source	Comments
CERES L0 files	Instrument level 0 data	3/day; EDOS @ GSFC	~131/day; Land PEATE	In case of NPP, RDRs also contains spacecraft diary
Attitude	Attitude	12/day; GSFC Flight Dyn Facility	included in RDR	
Ephemeris	Ephemeris	12/day (Terra); GSFC Flight Dyn Facility 1/day (Aqua); same	included in RDR	
Imager Calibrated Data, Instantaneous	Imager Radiances & Geolocation Aerosols	288/day; MODAPS ~144/day; MODAPS	288/day; Land PEATE ~144/day; Land PEATE	CERES provided code to sub-sample radiance files at GSFC
Aerosol data	Aerosol (Coln) Optical thickness, type/size	1/day; MODAPS		For Terra/Aqua using MODIS MOD08 and MATCH. Plan to do same for NPP
Meteorological and Ozone data	3-D Met Data 2-D atmospheric data 2-D constants	4/day; GMAO 24/day; GMAO 1; GMAO		
Precipitable Water	2-D constants	2/day; Global Hydrology Resource Center (GHRC)		
Geostationary data	MCIDAS data from 5 geostationary satellites per month	120/day; University of Wisconsin Space Science and Engineering Center (SSEC)		Only every 3rd hour is used for production
SURFMAP(Snow/Ice)	Snow/Ice Map	4/day; NCEP/NESDIS		
SURFMAP(Snow/Ice)	Snow/Ice Map	1/day; NSIDC		

Shared NPP and Terra/Aqua Data Source

Data Availability to Users

- There are 3 categories of User Access
  - LaRC only
    - All files are available to LaRC personnel
  - Science Team
    - Many files are automatically made available via ASDC's ordering tools (Example: Beta and Edition versions of primary archival products for which Data Quality Summary not yet available)
    - Other files can be requested by Science Team (Examples: Internal products, QC products)
  - Public
    - Beta and Edition versions of primary archival products available once
      - Data Quality Summary available
      - Sample Read package available

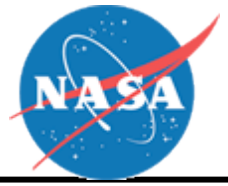
Development and Production Platforms

- Most efficient to develop code on machine that is identical to production platform
  - Same environment including Toolkit, operating system, compiler, HDF, and library versions
  - Science approves for delivery to production platform newly developed code by examining associated data runs
    - Science shouldn't have to repeat exercise on production platform
    - Unless production environment itself introduced a change, data management can quickly compare files created in development and production environments
- Access to production output products from development machine improves efficiency
  - No need to order data, no duplicate copies of products
  - Faster to evaluate and use data sets

Lessons Learned When Delivering Code and Testing

- Data Management personnel create expected output on target production machine
  - Verify that expected output looks as expected on target machine
- CM untars delivery and compiles source code on target machine, runs to reproduce expected output
  - Verify that delivery tar file includes all necessary components prior to turning delivery over to ASDC for testing
- Once delivery is in production do not immediately begin running an Edition data set
  - Run ValRx for all instrument/input combinations
    - Ensure production environment not altering output
    - Ensure correct files were delivered
    - Ensure scripts set up correctly
- Delivery steps are included in Backup slides

CERES Data Set Versions (Production Strategies)



- Beta
  - Data ready for evaluation by User Community
  - Not of publication quality
  - May be removed from archive at any time, typically after Edition supercedes it
  - Not all Beta data sets are made available to public
  - Examples: Beta1, Beta2, Beta1-Ed3, Beta2-Ed3
- ValR
  - Typically not archived, never made available to public
  - Final validation runs prior to processing an Edition
- Special versions
  - May or may not be made available to the public
  - Examples: Ed2C-MOD-C4-Land-IGBP, FailingSensor, Transient-Ops2
- Edition

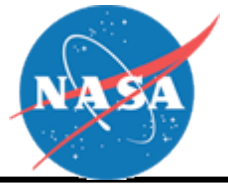
CERES Edition Data Sets

- Edition Data Sets
  - Validated data set, may be used for publication
  - Expected to remain publicly available even after later Editions supercede it
  - Examples: Edition1, Edition1-CV, Edition2, Edition2A, Ed2F-NoSW
  - Change in number indicates major scientific changes
  - Change in letter indicates other scientific change
    - Change in input data (imager, MOA)
    - Algorithm correction affecting few parameters
    - Algorithm correction producing minor changes

CERES Processing Software

Subsystem Number	Subsystem Name	LOC (to nearest 1K)	Publicly Available Date Products	Product Frequency	Comments
	CERESlib	115K			All Satellites
1	Instrument/Pre-Processor	4K			NPP only
1	Instrument	110K	BDS	1/day	All Satellites
2	ERBElike/ Inversion	33K	ES-8	1/day	All Satellites
3	ERBElike/ TSA	16K	ES-9, ES-4	1/month	All Satellites
12	MOA	10K			Run monthly
4.1 – 4.4	Clouds	231K			All Satellites
4.5 – 4.6	Inversion	26K	SSF	1/hour	All Satellites
5	SARB	51K	CRS	1/hour	All Satellites
6 & 9	TISA-Gridding	31K	FSW, SFC, ISCCP-D2like-Day/Nit	60/month, 36/month, 1/month	All Satellites
11	GGEO	50K	ISCCP-D2like-GEO	1/month	Geostationary
7.2	Synoptic SARB	10K			All Satellites
7.1 & 8 10	TISA-Averaging	164K	SYN, AVG, ZAVG SRBAVG	1/day, 1/month, 1/month 5/month	All Satellites
	TOTAL LOC	851K			

Current CERES Terra/Aqua Processing Approach



CERES processes data 3 times

Baseline1-QC	**Edition1-CV**	**Edition2**
• Processed daily • Run Instrument & ERBElike Inversion subsystems • Use Composite Snow Map • Not publicly available	• Processed monthly • Run Instrument and ERBElike subsystems • Use actual Snow map and wait for all expected instrument inputs • CV stands for "Calibration/Validation" • Primary Instrument & ERBElike products made publicly available	• Processed in blocks of 4+ months at a time • Run all CERES subsystems as inputs become available • All primary archival products made publicly available

Baseline1-QC Processing

- Latency
  - Begin processing 5-6 hours after End of Day
- Processing
  - Instrument (BDS, IES)*
  - ERBElike Inversion (ES8)*
- How is Baseline1-QC used?
  - Monitor instrument health and evaluate anomalies
  - IES* is input to FLASHflux
    - **F**ast **L**ongwave **A**nd **SH**ortwave radiative **FLUX**es
    - Produces FLASH_SSF* and FLASH_TISA files within a week of data date
    - Used by climate/ocean modelers, satellite science teams, renewable energy and agriculture industries

* Instantaneous Data

Edition1-CV Processing

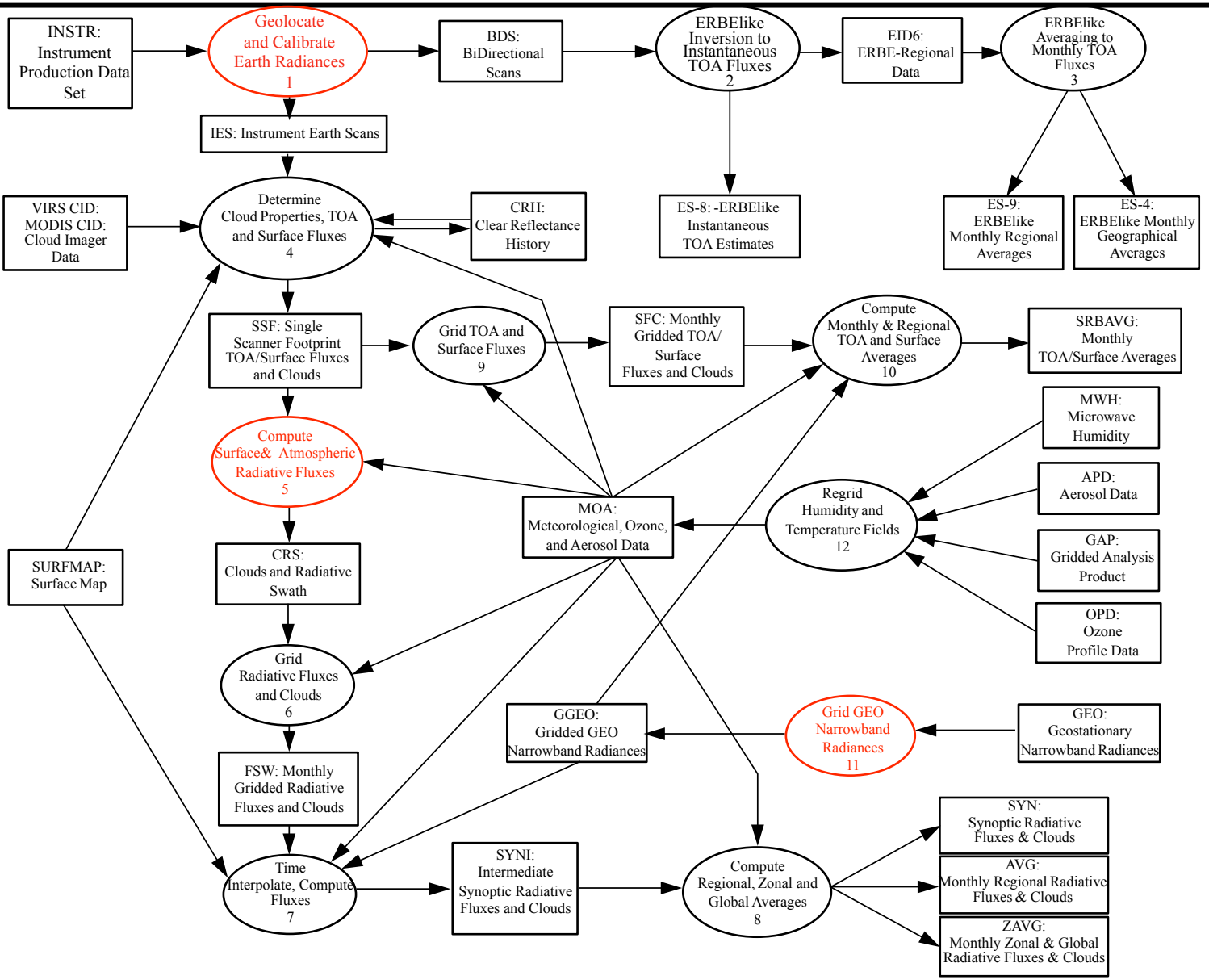
- Latency
  - Begin processing 5-30 days after End Of Month (EOM)
    - Snow and Ice available 5 days after EOM
    - Wait up to 30 days after EOM for all available instrument data
- Processing
  - Instrument (BDS, IES)*
  - ERBElike Inversion (ES8)*
  - ERBElike TSA (ES4, ES9)
- How is Edition1-CV used?
  - Determine instrument calibration
  - Trending
  - Edition1-CV BDS is input to Edition2 processing

* Instantaneous Data

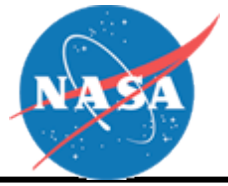
Edition2 Processing

	Stage 1	Stage 2	Stage 3	Stage 4
Latency	6 – 24 months (Wait for Gains and SRF based on Edition1-CV)	~6 months after SFC (Wait for Cal Coef for geo-sat)	Wait for aerosol inputs (MATCH-like data)	Wait for GGEO and FSW availability
Processing	Instrument (BDS, IES)* ERBElike Inv (ES8)* ERBElike TSA (ES4, ES9) MOA (MOA) Clouds (Temp)* Inversion (SSF)* TISA-gridding (SFC)	GGEO (GGEO) TISA-Averaging (SRBAVG)	SARB (CRS)* TISA-Gridding (FSW)	TISA-averaging (TSIB) Synoptic SARB (SYNI) TISA-Averaging (SYN, AVG, & ZAVG) * Instantaneous

CERES Data Flow Diagram



Relevant NPP Issues



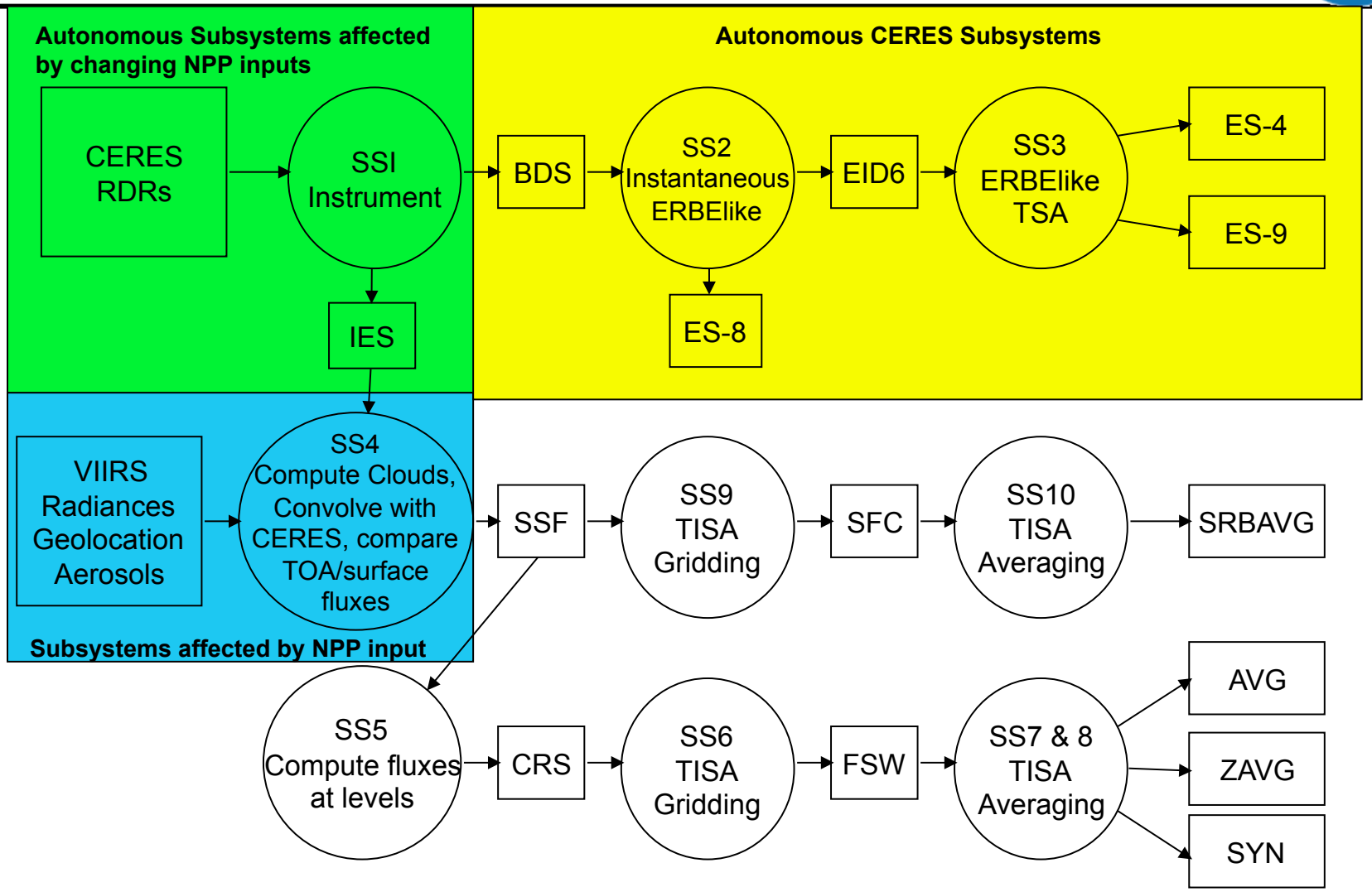
- Imager input data required for Climate Data Record (CDR) must be of climate quality and consistently calibrated over entire period.
  - In NPP era, Land PEATE provides CERES aggregated radiance and geolocation files and sub-samples data files using CERES provided code. Land PEATE also provides AOT files that correspond to sub-sampled radiance/geolocation.
  - For Terra/Aqua, MODAPS provides radiance, geolocation, and aerosol files from a collection that begins at covers open.
- NPP CERES made use of already existing interfaces.
  - Cost savings by using existing infrastructure.
  - Land PEATE already getting VIIRS data. Agreed to also obtain CERES RDRs.
  - Network between Land PEATE and ASDC exists for Terra/Aqua.

CERES Input Data

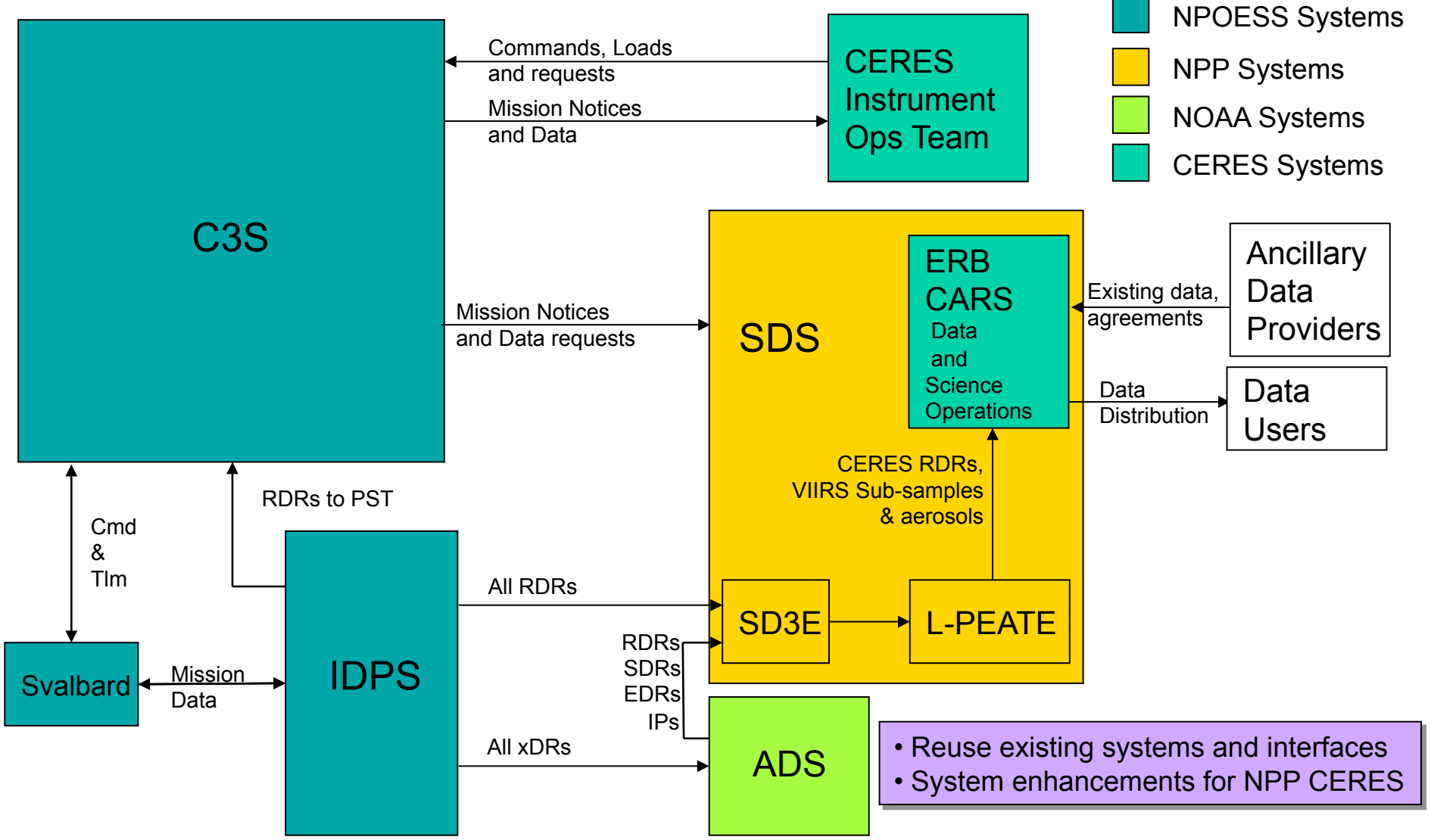
Type of Data	Parameter Description	Terra/Aqua Freq & Source	NPP Freq & Source	Comments
CERES L0 files	Instrument level 0 data	3/day; EDOS @ GSFC	~131/day; Land PEATE	In case of NPP, RDRs also contains spacecraft diary
Attitude	Attitude	12/day; GSFC Flight Dyn Facility	included in RDR	
Ephemeris	Ephemeris	12/day (Terra); GSFC Flight Dyn Facility 1/day (Aqua); same	included in RDR	
Imager Calibrated Data, Instantaneous	Imager Radiances & Geolocation Aerosols	288/day; MODAPS ~144/day; MODAPS	288/day; Land PEATE ~144/day; Land PEATE	CERES provided code to sub-sample radiance files at GSFC
Aerosol data	Aerosol (Coln) Optical thickness, type/size	1/day; MODAPS		For Terra/Aqua using MODIS MOD08 and MATCH. Plan to do same for NPP
Meteorological and Ozone data	3-D Met Data 2-D atmospheric data 2-D constants	4/day; GMAO 24/day; GMAO 1; GMAO		
Precipitable Water	2-D constants	2/day; Global Hydrology Resource Center (GHRC)		
Geostationary data	MCIDAS data from 5 geostationary satellites per month	120/day; University of Wisconsin Space Science and Engineering Center (SSEC)		Only every 3rd hour is used for production
SURFMAP(Snow/Ice)	Snow/Ice Map	4/day; NCEP/NESDIS		
SURFMAP(Snow/Ice)	Snow/Ice Map	1/day; NSIDC		

Shared NPP and Terra/Aqua Data Source

Simplified CERES Processing Flow



NPP CERES Operational Data Flow



Platform Migration

- Codes typically must be modified to work on new platform
  - Extensive updates may be needed
  - Takes time, may not be highest priority
  - Currently migrating last 2 CERES subsystems off SGI and onto IBM cluster
- Because CERES produces Climate Data Records, must verify that output is scientifically equivalent regardless of production platform
  - Can't upgrade algorithms as part of migration

Edition3 Terra and Aqua

- Edition3 BDS and ERBElike data sets are delayed until Gains and Spectral Response Functions (SRF) available
  - Once Science approves Gains & SRF, production expected to begin within 4-6 weeks
  - Other CERES Edition3 data sets will follow as code deliveries are made
- CERES will reprocess and forward process all data
- Terra and Aqua data sets will be of very similar quality
- Product parameters may be added or changed
  - SSF size to increase over 33%! (over 50 parameters added)
- Edition2 will extend until Edition3 catches up
  - Expect letter change in Edition2 data set names starting 2008 due to switch from GEOS-4 to G5-CERES

Main Terra and Aqua Edition2 Data Sets

Product	Latest Edition	Data available through	Comments
BDS, ES8, ES4, ES9	Edition2 (T, A)	Aug'07	Waiting on gains/SRF
SSF	Edition2F (T) Edition2C (A)	Aug'07	
SFC	Edition2F (T) Edition2C (A)	Aug'07	
SRBAVG	Edition2D (T) Edition2A (A)	Oct'05	Waiting on geostationary coefficients & code delivery
CRS	Edition2F (T) Edition2C (A)	Aug'07	Have MATCH inputs thru Dec'07.
FSW	Edition2F (T) Edition2C (A)	Aug'07	
SYN, AVG, ZAVG	Edition2C (T) Edition2B (A)	Oct'05	Currently processing. Expected to finish through Oct'05 in June.
ISCCP-D2like-Day, ISCCP-D2like-Nit	Beta1	Aug'07	
ISCCP-D2like-Geo	Beta1	Oct'05	

Documentation Overview

(http://eosweb.larc.nasa.gov/PRODOCS/ceres/table_ceres.html)

- Data Quality Summaries
  - Detailed information about a particular data set
  - Living Document; most up-to-date
  - Always consult Data Quality Summary prior to using data or publishing research
- Data Products Catalog
  - Parameter lists for each data product
  - Version of pages that apply to data set included with order
- Collection Guides
  - User Guide for data product
- Description/Abstract
  - Record of differences between data sets and configuration codes

Questions about Data Sets??

- Look over Data Products Catalog pages
- Reread Data Quality Summary
- Consult Collection Guide, if available
- Specific science questions may be sent to Contact Scientist listed in Section 2.2 of Collection Guide or in Description/Abstract
- All other questions should be sent to User Services

  larc@eos.nasa.gov
- For data products for which no Collection Guide or Description/Abstract is available, send all questions to User Services

Science Data Product URLs and Contacts

- Ordering Data
  - http://eosweb.larc.nasa.gov/HBDOCS/langley_web_tool.html
  - https://wist.echo.nasa.gov/api
  - EOS Data Gateway was decommissioned Feb. 27, 2009.
- Subsets of SSF, CRS, and ES8 are available
  - Order data using Java version of Langley Ordering Tool
  - Can subset by parameters or latitude/longitude box
- Contact Points
  - All questions regarding production data products and their use
    - E-mail: larc@eos.nasa.gov
    - Langley ASDC Customer Service
- CERES News (e-mail)
  - Subscribe from CERES Data Products webpage
  - All new public datasets are announced soon after public release
  - Mechanism for distributing CERES information

Backup Slides

CERES Data Set Naming Convention

CER_Product-ID_Sampling-Strategy_Production-Strategy

Examples: CER_SYN_Terra-FM1-MODIS_Edition2F,
CER_ES4_Terra-FM2_Edition2

Fields in Filename include:

- CER is investigation designation for CERES
- Product-ID specifies the data product (Ex: BDS, ES8, ES4, ES9, CRS, FSW, AVG, SYN, etc.)
- Sampling-Strategy specifies platform and/or instrument(s) (Ex: Terra-FM2, Aqua-FM3-MODIS, FM1+FM3)
- Production-Strategy specifies the version (Ex: Beta6, Edition1-CV, Edition2F, EdC-NoSW)
- Within the name, underscores separate the different fields and dashes are used to separate strings within a field

CERES File Naming Convention

Same as Data Set naming convention but has Configuration Code (CC) and data date appended to the end

(Example: CER_SSF_Aqua-FM3-MODIS_Edition2C_034040.2007073100)

- Configuration code is a 6 digit number for file and software version management. All files in data set are considered scientifically equivalent regardless of Configuration Code.
  - CERES recommends users always order newest files (those with largest CC)
  - Users may mix and match files from same data set regardless of CC
- Data date preceded by a "." includes 4-digit year, 2-digit month, 2-digit day (daily and hourly products only), and 2-digit hour (hourly products only)
- Gridded products may also have a zone appended directly after the date (Ex: ".200510Z36)

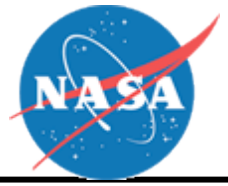
Steps to Software Delivery-1

- Data Management Team receives, reviews, & logs Requirement from the Science Team
- DM Subsystem Team prepares an SCCR – entering the requirement number in the SCCR & entering the SCCR number into the Requirement Log (bidirectional traceability)
- Requirement is implemented and unit tested by the DM Subsystem Team
- Code is integrated into baseline
- Delivery is added to the CERES Subsystem Delivery Schedule
- Preliminary Delivery Memo is prepared and sent to CERES CM as scheduled

Steps to Software Delivery-2

- Ensure that the correct output file names are included in and are consistent between the Test Plan and Operator's Manual and that these names accurately reflect the names of the output files that are created by the software
- Subsystem personnel create expected output on production system
- Prepare tar files as per naming convention – source code, ancillary data, & other data
- Tar files and associated documentation are delivered to CERES CM on or before scheduled date via cm_move.csh script
- Send final Delivery Memo to CERES CM

Steps to Software Delivery-3



- CM Testing
  - Install software in the SSI&T area on production system
  - Compile code
  - Test code according to subsystem Test Plan
  - Compare results with expected output to ensure code is successfully migrated
- Software released to SIT Team at ASDC
- Operational testing at ASDC in SSI&T area
- Software promoted to production
- ValRx testing at ASDC in production area
- Final tar files of promoted software & data retrieved by CERES CM

CERES Data Product Status

- Data available free from the LaRC Atmospheric Sciences Data Center at: http://eosweb.larc.nasa.gov/project/ceres/table_ceres.html
- Rev1 SW flux correction tables for all months to 12/2007 (~ 1% changes) available in simple on-line tables in Data Quality Summaries.
  - Rev1 is a user applied correction and primarily affects trend studies.
  - Rev1 is applicable to most, but not all, CERES Edition2 data sets (check Data Quality Summary)
- Aqua data sets more advanced than Terra especially for polar clouds.
- Currently anticipate production of Edition3 BDS, ES-8, ES-4, and ES-9 products by late 2009.
- Working with NASA NEWS group, the CERES/CALIPSO/CloudSat/MODIS (C3M) merged, fusion product was generated for July 06. Oct 06, Jan 07 and Apr 07 will be produced soon. Plan is to have these available to the NEWS group through the ASDC ordering tool in the near future.

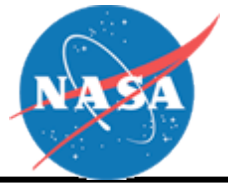
CERES Data Sets Publicly Released Since October 2008

Data Set	Comments
CER_SSF_Aqua-FMx-MODIS_Ed2C-MOD-C4-Land-IGBP	Replaces current IGBP map used in CERES processing with updated IGBP map based on MODIS Collection 004 (plan to produce 2 yrs)
CER_AVG_Aqua-FMx-MODIS_Edition2B CER_AVG_Terra-FMx-MODIS_Edition2C CER_ZAVG_Aqua-FMx-MODIS_Edition2B CER_ZAVG_Terra-FMx-MODIS_Edition2C CER_SYN_Aqua-FMx-MODIS_Edition2B CER_SYN_Terra-FMx-MODIS_Edition2C	First Edition version Only available for Cross-track Instrument Monthly product corresponding to CRS/FSW data sets

CERES Data Sets Currently In Production (1 of 2)

Data Set	Comments
CER_BDS_Terra-FMx_Edition2 CER_ES8_Terra-FMx_Edition2 CER_ES4_Terra-FMx_Edition2 CER_ES9_Terra-FMx_Edition2 CER_BDS_Aqua-FMx_Edition2/Ed2-NoSW CER_ES8_Aqua-FMx_Edition2/Ed2-NoSW CER_ES4_Aqua-FMx_Edition2/Ed2-NoSW CER_ES9_Aqua-FMx_Edition2/Ed2-NoSW CER_ES4_FM1+FM3_Edition2 CER_ES9_FM1+FM3_Edition2	2007 dates Combine only Crosstrack instruments
CER_SSF_Aqua-FMx-MODIS_Edition2C CER_SSF_Terra-FMx-MODIS_Edition2F CER_SFC_Aqua-FMx-MODIS_Edition2C CER_SFC_Terra-FMx-MODIS_Edition2F	2007 dates

CERES Data Sets
Currently in Production (2 of 2)



Data Set	Comments
CER_CRS_Aqua-FMx-MODIS_Edition2C CER_CRS_Terra-FMx-MODIS_Edition2F CER_FSW_Aqua-FMx-MODIS_Edition2C CER_FSW_Terra-FMx-MODIS_Edition2F	2007 dates
CER_SYN_Aqua-FMx-MODIS_Edition2B CER_SYN_Terra-FMx-MODIS_Edition2C CER_AVG_Aqua-FMx-MODIS_Edition2B CER_AVG_Terra-FMx-MODIS_Edition2C CER_ZAVG_Aqua-FMx-MODIS_Edition2B CER_ZAVG_Terra-FMx-MODIS_Edition2C	First Edition version Monthly product corresponding to CRS/FSW data sets
CER_SSF_Aqua-FMx-MODIS_Ed2C-MOD-C4-Land-IGBP	Replaces current IGBP map used in CERES processing with updated IGBP map based on MODIS Collection 004 (plan to produce 2 yrs)

Up and Coming CERES Data Sets Expected By October 2009 (1 of 2)

Data Set	Comments
CER_ISCCP-D2like-Day_Terra-FMx-MODIS_Edition2B CER_ISCCP-D2like-Day_Terra-FMx-MODIS_Edition2F CER_ISCCP-D2like-Nit_Terra-FMx-MODIS_Edition2B CER_ISCCP-D2like-Nit_Terra-FMx-MODIS_Edition2F CER_ISCCP-D2like-Day_Aqua-FMx-MODIS_Edition2B CER_ISCCP-D2like-Day_Aqua-FMx-MODIS_Edition2C CER_ISCCP-D2like-Nit_Aqua-FMx-MODIS_Edition2B CER_ISCCP-D2like-Nit_Aqua-FMx-MODIS_Edition2C	•Based on SSF Edition numbers. •Dependent on MODIS data
CER_ISCCP-D2like_GEO_Composite_Edition2A	•Independent of MODIS data
CER_SRBAVGx_Terra-FMx-MODIS_Edition2E CER_SRBAVGx_Terra-FMx-MODIS_Edition2F CER_SRBAVGx_Aqua-FMx-MODIS_Edition2B CER_SRBAVGx_Aqua-FMx-MODIS_Edition2C	•Handle RAPS data •Monthly product corresponding to SSF/ SFC data sets

Up and Coming CERES Data Sets Expected By October 2009 (2 of 2)

Data Set	Comments
CER_BDS_Aqua-FMx_Edition3 CER_ES8_Terra-FMx_Edition3 CER_ES4_Aqua-FMx_Edition3 CER_ES9_Terra-FMx_Edition3	• Incorporates Edition3 gains and spectral response functions
CER_SSF_Aqua-FMx-MODIS_Edition2D CER_SSF_Terra-FMx-MODIS_Edition2G CER_SFC_Aqua-FMx-MODIS_Edition2D CER_SFC_Terra-FMx-MODIS_Edition2G	• Extension of Terra Edition2F and Aqua Edition2C data sets after the switch to GMAO's G5-CERES dataset for 2008 • No CERES algorithm changes
CER_SSF_Aqua-FMx-MODIS_Beta2-Ed3 CER_SSF_Terra-FMx-MODIS_Beta2-Ed3 CER_SFC_Aqua-FMx-MODIS_Beta2-Ed3 CER_SFC_Terra-FMx-MODIS_Beta2-Ed3	• First Beta version of Edition3 (Beta1-Ed3 was never fully run.)

For the Record Slides

Updated Since October 2009

Older CERES Science Data Sets

Still of Interest (Calibration/Validation)

Data Set	Comments
CER_BDS_TRMM-PFM_Edition1-CV CER_ES8_TRMM-PFM_Edition1-CV CER_ES4_TRMM-PFM_Edition1-CV CER_ES9_TRMM-PFM_Edition1-CV CER_BDS_TRMM-PFM_Ed1-CV-TransOps CER_ES8_TRMM-PFM_Ed1-CV-TransOps CER_ES4_TRMM-PFM_Ed1-CV-TransOps CER_ES9_TRMM-PFM_Ed1-CV-TransOps	• 12/27/1997 through 8/31/1998; March 2000 (Edition1-CV) • Select transient operation periods during 1999 (Ed1-CV-TransOps) • Algorithms held constant across entire data set
CER_BDS_Terra-FMx_Edition1-CV CER_ES8_Terra-FMx_Edition1-CV CER_ES4_Terra-FMx_Edition1-CV CER_ES9_Terra-FMx_Edition1-CV	• All Terra data from time the covers opened through present • Replaces Edition1 • Algorithms to be held constant across entire data set • Algorithms consistent between Terra and Aqua • Publicly available • Constantly extending

Older CERES Science Data Sets

Still of Interest (Calibration/Validation)

Data Set	Comments
CER_BDS_Aqua-FMx_Edition1-CV CER_ES8_Aqua-FMx_Edition1-CV CER_ES4_Aqua-FMx_Edition1-CV CER_ES9_Aqua-FMx_Edition1-CV	• All Aqua-FM3 data from time the covers opened through present • Aqua FM4 data from 6/19/02 - 3/29/05 • Replaces Edition1 • Algorithms to be held constant across entire data set • Publicly available • Constantly extending
CER_BDS_Aqua-FM4_Ed1-CV-NoSW CER_ES8_Aqua-FM4_Ed1-CV-NoSW CER_ES4_Aqua-FM4_Ed1-CV-NoSW CER_ES9_Aqua-FM4_Ed1-CV-NoSW	• 3/30/05 through present • Same algorithms and processing as Edition1-CV • Due to SW channel failure, no daytime SW or LW radiances and fluxes • Available to Science Team • Constantly extending
CER_BDS_Aqua-FM4_AnomOps-Ed1-CV CER_ES8_Aqua-FM4_AnomOps-Ed1-CV CER_ES4_Aqua-FM4_AnomOps-Ed1-CV CER_ES9_Aqua-FM4_AnomOpsEd1-CV	• 7/19/05 through 8/30/05 • Same algorithms and processing as Edition2 • Due to instrument temperature changes made in hopes of reversing SW channel problem, data quality varies from Ed1-CV-NoSW • Available to Science Team (no public release)

Older CERES Science Data Sets
Still of Interest (TRMM)

Data Set	Comments
CER_BDS_TRMM-PFM_Edition1 CER_ES8_TRMM-PFM_Edition2 CER_ES4_TRMM-PFM_Edition2 CER_ES9_TRMM-PFM_Edition2 CER_SSF_TRMM-PFM-VIRS_Edition2B CER_SFC_TRMM-PFM-VIRS_Edition2B CER_SRBAVG_TRMM-PFM-VIRS_Edition2B CER_CRS_ TRMM-PFM-VIRS_Edition2C CER_FSW_ TRMM-PFM-VIRS_Edition2C	• TRMM period Jan'98 – Aug'98; Mar'00 • Publicly available
CER_BDS_TRMM-PFM_Transient-Ops2 CER_ES8_TRMM-PFM_Transient-Ops2 CER_SSF_TRMM-PFM-VIRS_Edition2B-TransOps	• Transient Operations period Jan'99 – Jul'99 • BDS not publicly released; others publicly available
CER_ES4_PFM+FM1+FM2_Edition2 CER_ES9_PFM+FM1+FM2_Edition2 CER_ES4_PFM +FM1_Edition2 CER_ES9_PFM+FM1_Edition2 CER_ES4_PFM+FM2_Edition2 CER_ES9_PFM+FM2_Edition2	• Mar'00 only month of TRMM, Terra overlap • Publicly available
CER_SSF_TRMM-SIM-VIRS_Edition2-VIRSonly	• Processed only for months when CERES was off • Processed through Jul'01; no additional months expected • Publicly available

Older CERES Science Data Sets

Still of Interest (Terra)

Data Set	Comments
CER_BDS_Terra-FMx_Edition2 CER_ES8_Terra-FMx_Edition2 CER_ES4_Terra-FMx_Edition2 CER_ES9_Terra-FMx_Edition2	• Rev1 SW corrections available • 2/25/00 – 8/31/07 processed, 9/1/07 - 12/31/07 coming Spring/ Summer '09 • Publicly available
CER_ES4_FM1+FM2_Edition2 CER_ES9_FM1+FM2_Edition2	• Processed Mar'00 through Dec'02, production then halted • Replaced by Terra/Aqua combined Crosstrack data sets (FM1+FM3, FM1+FM4, FM2+FM3 Edition2) • Publicly available
CER_SSF_ Terra-FMx-MODIS_Edition2B CER_SFC_Terra-FMx-MODIS_Edition2C	• 2/25/00 – 8/1/06, no additional processing expected • Uses Edition2 instrument and collection 4 MODIS data as input • Edition2 Clouds, Final Terra ADMs, Rev1 SW corrections available • Publicly available
CER_SRBAVG_Terra-FMx-MODIS_Edition2D	• Edition2C SFC are input • 3/00 - 10/05 processed, no additional processing expected • Publicly available
CER_CRS_ Terra-FMx-MODIS_Edition2B CER_FSW_Terra-FMx-MODIS_Edition2C	• 3/1/00 – 06/30/06 processed, no additional processing expected • Edition2B SSF input; latest version of SARB algorithms • Publicly available
CER_SSF_ Terra-FMx-MODIS_Edition2F CER_SFC_Terra-FMx-MODIS_Edition2F	• 1/06, 5/06 – 8/07 complete; 9/07 – 12/07 expected soon • Uses Edition2 instrument and collection 5 MODIS data as input • Edition2 Clouds, Final Terra ADMs, Rev1 SW corrections available • Publicly available

Older CERES Science Data Sets

Still of Interest (Terra)

Data Set	Comments
CER_CRS_ Terra-FMx-MODIS_Edition2F CER_FSW_Terra-FMx-MODIS_Edition2F	• 1/06, 5/06 – 8/07 complete; 9/07 – 12/07 expected soon • Edition2F SSF input; latest version of SARB algorithms • Publicly available
CERES_EBAF_TOA_Terra_Edition1A	• EBAF - Energy Balanced and Filled • Adjusted net TOA flux dataset based on SRBAVG GEO Edition2D-Rev1 • netCDF format • March 2000 – October 2005, no additional processing expected
CER_ISCCP-D2like-Day_Terra-FMx-MODIS_Beta1 CER_ISCCP-D2like-Nit_Terra-FMx-MODIS_Beta1	• First Beta version • Dependent on MODIS data • March 2000 – August 2007, no additional processing expected

Older CERES Science Data Sets

Still of Interest (Aqua)

Data Set	Comments
CER_BDS_Aqua-FMx_Edition2 CER_ES8_Aqua-FMx_Edition2 CER_ES4_Aqua-FMx_Edition2 CER_ES9_Aqua-FMx_Edition2 CER_BDS_Aqua-FM4_Ed2-NoSW CER_ES8_Aqua-FM4_Ed2-NoSW CER_ES4_Aqua-FM4_Ed2-NoSW CER_ES9_Aqua-FM4_Ed2-NoSW	• Rev1 SW corrections available • Aqua-FM4 Edition2 processed 6/18/02 – 3/29/05 • Aqua-FM4 Ed2-NoSW processed 3/30/05 – 9/01/07, expect 9/2/07 - 12/31/07 in Winter '09 • Aqua-FM3 Edition2 processed 6/18/02 – 9/01/07, expect 9/2/07 - 12/31/07 in Spring/Summer '09 • Edition2 publicly available • Ed2-NoSW available to Science Team
CER_ES4_FM1+FM3_Edition2 CER_ES4_FM2+FM3_Edition2 CER_ES4_FM1+FM4_Edition2 CER_ES9_FM1+FM3_Edition2 CER_ES9_FM2+FM3_Edition2 CER_ES9_FM1+FM4_Edition2	• Combine only Crosstrack instruments • 7/02 – 12/06 available, 1/07 – 08/07 expected in Fall '08, 09/07 – 12/07 expected in Winter '09 • Uses Terra Edition2 and Aqua Edition2 inputs • Publicly available

Older CERES Science Data Sets

Still of Interest (Aqua)

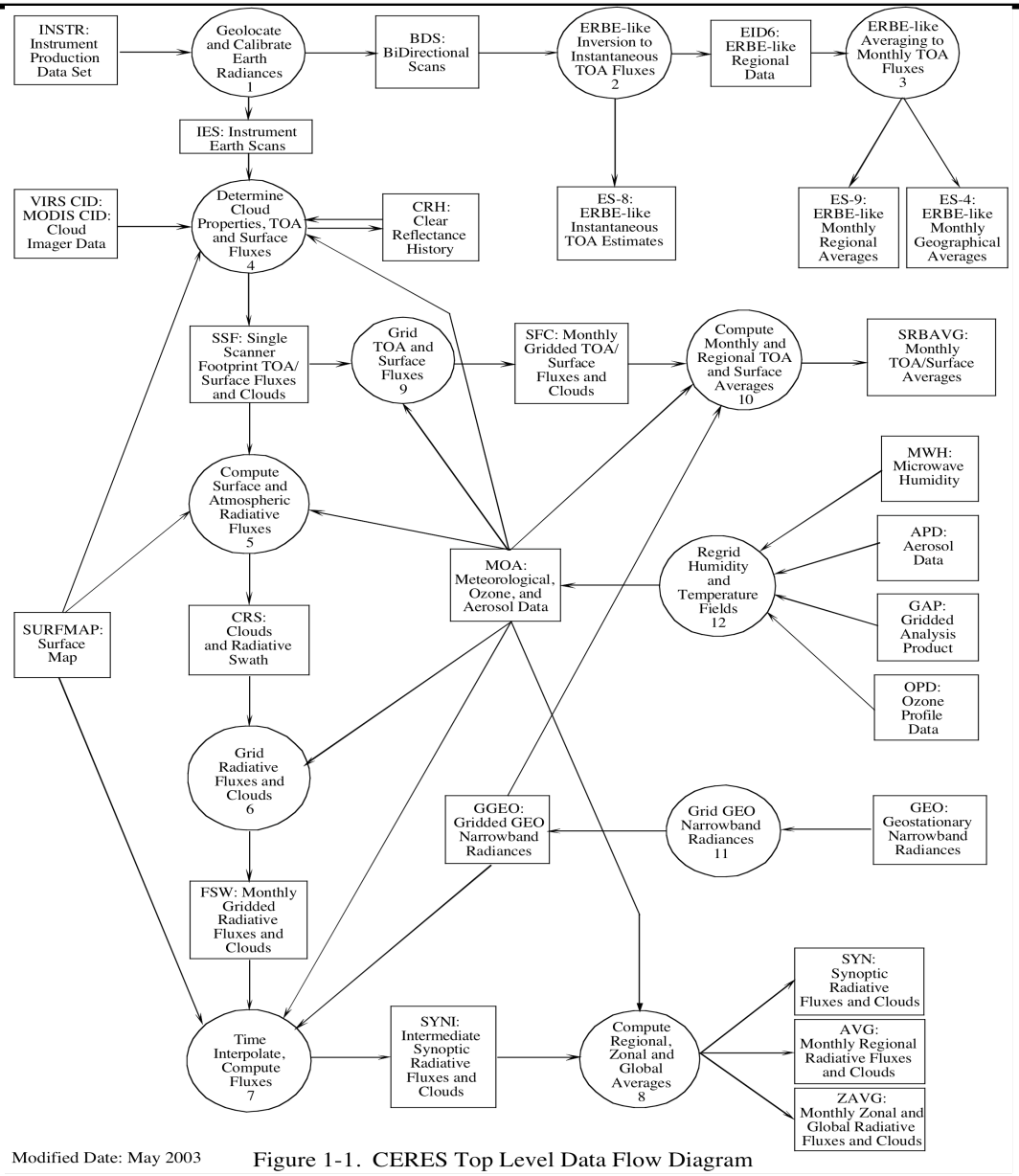
Data Set	Comments
CER_SSF_Aqua-FMx-MODIS_Edition2B CER_SSF_Aqua-FM4-MODIS_Ed2B-NoSW CER_SFC_Aqua-FMx-MODIS_Edition2B CER_SFC_Aqua-FM4-MODIS_Ed2B-NoSW	• Corrects Model B SW surface fluxes, all other parameters remain the same as Edition2A • 7/02 -4/06, FM4 SW channel failed 3/30/05 hour 18, no additional processing expected • Rev1 SW corrections available • All SSF and Edition2B SFC publicly available • Ed2B-NoSW SFC available to Science Team only
CER_CRS_Aqua-FMx-MODIS_Edition2B CER_FSW_Aqua-FMx-MODIS_Edition2B	• Available only for main cross-track instrument • 7/02 – 4/06, no additional processing expected • Publicly available • Corrects Model B SW Surface fluxes, modifies aerosol hierarchy
CER_SSF_Aqua-FM3-MODIS_Edition2C CER_SSF_Aqua-FM4-MODIS_Ed2C-NoSW CER_SFC_Aqua-FM3-MODIS_Edition2C CER_SFC_Aqua-FM4-MODIS_Ed2C-NoSW	• Extension of Edition2B data sets • 1/06, 5/06-8/07 processed; 9/07 – 12/07 expected this summer • Rev1 SW corrections available • All SSF and Edition2C SFC publicly available • Ed2C-NoSW SFC available to Science Team only
CER_CRS_Aqua-FMx-MODIS_Edition2C CER_FSW_Aqua-FMx-MODIS_Edition2C	• Available only for main cross-track instrument • 1/06, 5/06-8/07 processed; 9/07 – 12/07 expected this summer • Publicly available • Corrects Model B SW Surface fluxes, modifies aerosol hierarchy

Older CERES Science Data Sets

Still of Interest (GEO)

Data Set	Comments
CER_ISCCP-D2like-Day_Aqua-FMx-MODIS_Beta1 CER_ISCCP-D2like-Nit_Aqua-FMx-MODIS_Beta1	• First Beta version • Dependent on MODIS data • July 2002 – August 2007, no additional processing expected
CER_ISCCP-D2like-GEO_Composite_Beta1	• First Beta version • Independent of MODIS data • March 2000 – October 2005

CERES Data Flow Diagram



Modified Date: May 2003

Figure 1-1. CERES Top Level Data Flow Diagram